Most teachers are familiar with the term “planning,” the individual means by which teachers think about and make teaching decisions, often in a cyclical manner (Yinger, 1977). Instructional design (ID), meanwhile, is a systematic process, frequently represented through linear-visual models, that prompts users to analyze, design, develop, implement, and evaluate these decisions (e.g., Dick, Carey, & Carey, 2005). In the context of a master’s level ID course, we have asked students to draw their own models of the ID process. Our pedagogical curiosity was to see how our students represented their personal process for designing instruction throughout the course, the sense they were making of a formal ID process that we espoused in the course, and their reflections on their final personal models that served as a culminating course project. Over 10 years of teaching ID we have had many teachers as students. In looking at these final models, we discovered that students revealed not only ID process components, which was the purpose of the task, but also their “views of teaching,” sometimes depicted in a predominant metaphor. In some models, views of teaching took primacy over any ID model component whatsoever.

This chapter summarizes our inquiry into how graphic representations revealed, how the students in our classes who self-identified as either pre-
service or practicing teachers viewed teaching. While the three questions that organize the volume are applied to this chapter, we are particularly focused on the issue of *Who did we ask?* Our research represents a unique approach in that we prompted teachers to visualize their own ID process and explain it, rather than giving them a published model that they should follow in their own practice. The first section of this chapter provides a conceptual background of teacher knowledge and beliefs, and the unique qualities of visual representations to shed light on the experiential nature of teacher knowledge and beliefs.

To address the question *How did we look?* We used a process of categorization and theme-building to analyze teachers’ personal models of ID. The second section describes the methodology we developed to analyze teachers’ personal models of ID. In terms of answering the question *How did we show what we saw?* We initially looked at how teachers represented the ID process, but our inquiry shifted to how teachers viewed teaching and the emergent categories of these views. The third section reports the results of our analysis reporting categories of model types and “views of teaching.” We conclude the chapter with a reflective section that addresses the issues common to all of the chapters in this volume.

**THE TEACHERS’ PERSPECTIVE**

We asked teachers to represent ID in their own models, rather than accepting our representation or the representations by published authors. This pedagogical decision implies a perspective on how teachers develop knowledge about teaching. In this section, we examine three perspectives on knowledge and teaching. Next, we summarize how visuals have contributed to teacher knowledge; specifically, models, images, and metaphors. Then, we make a case for connecting ID to teaching, which answers a hidden but important question: Why teach ID in the first place?

*Teachers’ Knowledge*

There is no agreement of what teacher knowledge is and how it develops. Researchers have characterized teacher knowledge and provided organizing frameworks in a number of ways (for a review see Cochran-Smith & Lytle, 1999a; Munby, Russell, & Martin, 2001). These perspectives frequently differ based on the role of researchers and teachers in “who is asking?” and
“who is being asked?” We use the three contrasting relationships posed by Cochran-Smith and Lytle (1999a) as a means to illustrate that educators frequently talk about teachers, teaching, and teacher learning in very different ways. Our inquiry, too, can be better appreciated, understood, and critiqued by discussing these different perspectives.

The three contrasting relationships of knowledge and practice are labeled by Cochran-Smith and Lytle (1999a) as knowledge-for-practice, knowledge-in-practice, and knowledge-of-practice. Each knowledge–practice relationship is categorized in terms of images; namely, images of knowledge; images of teachers, teaching, and professional practice; and images of teacher learning and teachers’ roles in educational change. To clarify these three knowledge–practice relationships we use the following terms: formal knowledge, practical knowledge, and transformative knowledge, respectively (see Table 1), in order to discuss our findings later in this chapter. We identify frequently cited examples of each knowledge–practice relationship, such as personal practical knowledge and pedagogical content knowledge, and record Images of Teacher Knowledge and Images of Teaching to see the differences in these images across the three perspectives.

Formal Knowledge

The first relationship of knowledge and practice, or knowledge-for-practice, as conceptualized by Cochran-Smith and Lytle (1999a), sees accomplished teachers are those who learn a body of knowledge and apply it in their teaching. A formal knowledge base characterizes this relationship (McDiarmid, Ball, & Anderson, 1989; Sikula, 1996; Wilson, Shulman, & Richert, 1987). Sometimes the term “best practices” is used and is based on empirical evidence of effectiveness and used by professional content area groups (Zemelman, Daniels, & Hyde, 1999). The novice-expert literature provides one construct example. Here studies contrast the differences between new and experienced teachers in the context of actual teaching (Borko, Bellamy, & Sanders, 1992). Novice-expert studies draw upon the research on expertise (Bereiter & Scardemalia, 1993) and characterize how teachers think, solve problems, and develop knowledge structures and how this development occurs over time (Berliner, 1988). One way to extract this thinking is to talk with experts as they solve problems. However, extracting the complexity of teaching out of teacher talk has been difficult and is not easily achieved (McIntyre & Hagger, 1993).

Another construct that has had a major impact on teacher knowledge is the pedagogical content knowledge (Shulman, 1986) that teachers’ need not only to know the subjects they teach, but how one appropriately teaches this
content. Categories of pedagogical content knowledge include useful representations of ideas, demonstrations, and examples. Other forms include knowledge of the different ways that learners learn this content and the

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range of conceptions and experiences students have with the content. A body of knowledge now exists that documents student misconceptions in key content areas, such as mathematics, science, reading, and writing (Ball, 1993; Bruer, 1993). Both pedagogical content knowledge and the wisdom of practice from Shulman (1987), straddle the formal knowledge perspective and the practical knowledge perspective, as both benefit from the findings from research as well as the experiences of teaching.

Practical Knowledge

The second relationship of knowledge and practice, or knowledge-in-practice, is intertwined and is not based on applying a formal body of knowledge as suggested in the previous relationship. Here, practical knowledge consists of what teachers know based on their teaching experience (Fenstermacher, 1994). Knowledge is developed from teaching and reflection. Shulman (2004) viewed teaching as more complex than medicine, and he made his case by comparing the wisdom of practice in medicine and teaching. He characterized the wisdom of practice in medicine as a physician’s competence in problem formulation and hypothesis generation, as well as an extensive knowledge base. The complexity of teaching, meanwhile, consists of many students, numerous goals, multiple constituencies, and continual unpredictability. The challenge for teachers, according to Shulman (2004), is to address this complexity with a limited amount of time and energy.

Craft knowledge is another construct that blends with Shulman’s wisdom of practice. The notion that teaching consists of human sensibilities, such as judgment and empathy, rather than a knowledge of rules. Grimmett and MacKinnon (1992) characterized craft knowledge as “teachers’ judgment in apprehending the events of practice from their own perspectives…” (p. 387). Related to craft knowledge is the notion of personal practical knowledge, as exemplified by Elbaz’s (1983) study of one high school English teacher and Clandinin’s (1986) study of three elementary teachers. Each of these studies revealed the complexity of knowledge in practice as explicated in the teachers’ images and their personal metaphors and later on the value of teachers’ narratives (Connolly & Clandinin, 1990). The ideas of reflectivity on teaching and during teaching (Schön, 1983) have had considerable influence on teacher knowledge and how to develop this knowledge in teacher education programs.

Transformative Knowledge

The third relationship of knowledge practice, or knowledge-of-practice, we have labeled as transformative knowledge, based on its overarching function
of teachers critiquing schools in the areas of curriculum, teacher autonomy, democratic schooling, and social justice. Such critiques are the focus for action research involving systematic inquiry into teaching and the contexts of teaching (Carr & Kemmis, 1986). The goal here is the raising of questions and the discussion by practitioners of issues facing them and their students. The improvement of teacher practice can also be furthered by action research in which the findings help the teacher and teacher communities gain an understanding of learning outcomes, learner differences, teaching strategies, and appropriate assessment and instructional technology (Cochran-Smith & Lytle, 1999a, b).

Another construct is the transformation of one’s self and identity, as discussed by Bullough and Gitlin (1995), which includes school histories, personal metaphors, shadow studies, and ethnographies. The focus of transformative knowledge is an ongoing self-study of teacher identity in the context of teaching and schools. Cochran-Smith and Lytle (1999a) cite this outcome as an “expanded view of practice” and awareness of the responsibility of being a teacher within a community, sometimes organized in teacher study groups or networks. Included in these methodologies are the use of teacher “talk” and the collaborative development of teacher knowledge within sustained conversations and commitments.

Visualizing Teaching

Our use of graphical representations continues the inquiry into teacher knowledge by using teachers’ models of ID as a lens to reveal their views of teaching. Teacher beliefs and teacher knowledge may be synonymous (Kagan, 1990), particularly for new teachers. This connection can be seen in the idea of teacher knowledge construed as personal practical knowledge (Richardson, 1996), although there have been attempts at distinguishing between beliefs and knowledge (Nespor, 1987).

Graphical representations of teacher knowledge and teaching can take many forms, including models, images, and metaphors. Models provide an important tool for representing reasoning and physical processes, and attempts have been made to model the learner (Bruner, 1985) and the teacher (Berliner, 1986). The value of models, images, and metaphors is that they assist the teacher in articulating the teachers’ world, rather attempting to formulate this world in terms of rules and propositions.
Models
Bruner (1985) surveys several models of the learner. The tabula rasa model begins with a person’s mind as a blank slate that records and accumulates experience. Another model characterizes the learner as a hypothesis generator and assets the value of a good theory. Yet another family of models are those in which humans use their minds to make sense of clutter and organize their experience. A constructivist model of the learner proposes stages in which growth is achieved through assimilating experience and accommodating the rules to experience. The novice-expert model of the learner favors any means by which one can move from knowing nothing about a particular domain to knowing a great deal. Such learning is accomplished by asking and modeling an expert and developing greater competence along some continuum of stages. Bruner insists that a model of the learner is necessary to improve the state of education, but he also argued that this model must vary to fit the nature of the learning task, the learning outcome, and learning situation itself. Having a variety of models, says Bruner, is a virtue because that choice of how to conceive learners is ultimately more helpful than proposing that one script fits all.

Berliner’s (1986) model of the teacher provides a review of the novice-expert approach as applied to teachers. He cites the value of such an approach as a starting point with novice teachers and that teaching expertise provides exemplary performances for newcomers to model. He argues that attempting to understand what makes a master teacher can be helpful for orienting cooperating teachers as they assist new teachers. Another value in studying expert teachers, according to Berliner, is that competence is valued by society and can influence educational policy. Specifically, Berliner identifies the necessity for expert teachers to possess subject matter knowledge and knowledge of organization and management of classrooms. Requiring both sets of knowledge, says Berliner, distinguishes teachers from other fields. Berliner (1988) adopts the model of human expertise of Dreyfus and Dreyfus (1986) to characterize the development of teacher expertise across five stages. At the novice stage, new teachers seek out rules, recipes, and strategies to guide their actions. At the advanced beginner stage, the teacher uses contextual experience to clarify the use of rules and strategies. The third stage involves competence where the teacher makes conscious actions and reflects on these actions. The fourth stage is proficiency where intuition and experience guides decisions. Finally, in the fifth stage of expertise a teacher’s thinking and actions are automatic and fluid, and the teacher is fully comfortable and in control of the classroom.
Images

Images are a broad category, but include any visual device, physical or mental, that creates a representation of views of teaching. A variety of work on teacher knowledge has used images to explore teacher knowledge. Calderhead (1996) summarizes the use of simulations, think-aloud commentaries, teacher narratives, ethnography and case studies, concept mapping, metaphors, and repertory grids to study these visuals. This variety of techniques is necessary, according to Calderhead, to analyze teachers’ work. Calderhead and Robson (1991) documented images of preservice teachers who imagined what teaching would be like, influenced partly by their own experiences (e.g., experiences with teachers, testing, relatives who were teachers). In his case study of a first-year teacher, Bullough (1989) noted the evolving images as mother figure, disciplinarian, reaching out, instructional leader, and professional. From his work using images of teaching, Korthagen (1993) reports that they can be resistant to change and encourage the use of these visual presentations of classrooms for teachers’ self-examination of their teaching.

Metaphors

A type of image is the metaphor which people use to frame their experiences. Teachers’ talk frequently consists of metaphors such as the flow of lessons or regarding students as “my kids” (Munby, 1986). Clandinin (1986) reported on the images or metaphors of elementary teachers, including “language is the key,” and the classroom as the home. Bullough (1991) documents several case studies in which teachers used metaphors to explain their teaching. Bullough and Gitlin’s (1995) chapter on personal metaphors profiled three teachers and their respective metaphors of bridge builder, guide, and expert. Teacher self-study groups may cite personal metaphors to report the discussions of their work. For example, one such group (Miller, East, Fitzgerald, Heston, & Veenstra, 2002) identified their best teaching in metaphors of a kaleidoscope, soil, Afghan construction, band conductor, and Yoda from the Star Wars movies. Metaphors allowed these teachers to encapsulate their views of teaching in ways that could be more easily talked about in shared professional stories.
Connecting Instructional Design to Teaching

Instructional Design for Student Learning

ID provides another example of developing both the formal knowledge for teacher education and professional development, and the practical knowledge experience in classroom teaching. We have depicted ID as a systematic tool to help all educators develop instruction and instructional products, but keeping learning in the forefront of teaching/design decisions (e.g., Shambaugh & Magliaro, 1997). Framed in this fashion, an ID course provides a reflective learning experience in which students clarify their beliefs while learning a process. Our intent in the course is not to persuade them to use a particular ID model, but to use the systematic features of ID to help teachers be clear about their teaching decisions and to grow as teachers through a continual re-examination of their beliefs and decisions (Shambaugh & Magliaro, 2006).

Teacher candidates typically develop instruction through lesson plans, a technique commonly taught in methods courses. Over time new teachers become more experienced at developing coherent sets of lessons without detailed lesson plans. Their planning approaches become highly personal-ized, less systematic, and less evident on paper than those they may have learned in teacher education programs (Kennedy, 1994). One challenge for instructors of ID working with teachers has been to teach an ID process, while realizing that ID may be used quite differently, if at all in the classroom (see Edmonds, Branch, & Mukherjee, 1994). Learning about a generic process and then adapting that process to a complex setting (Larabee, 2000) is representative of the overall teaching challenge in teacher education – how to help learners transfer their learning from an academic setting to a real world setting.

In the teaching of ID, graphical models are used to conceptually represent ID components, as well as depict a process to develop instruction. Models serve to deconstruct a systems view of important educational issues of instruction and suggest an orderly but specific set of activities. These activities tend to include analyzing the instructional need, designing of instruction to address this need, implementing the designed intervention, and evaluating its use. This systems approach helps instructional designers or teachers to examine the instructional problem in its entirety and design appropriate details. The premise behind using ID is that the individual components of the process help teachers develop instructionally sound interventions grounded in learning principles, which are in turn based on research. Moreover, the ID process provides a tool to ensure the coherency and appro-
priateness of decisions that determine learning outcomes, teaching, and assessment (Shambaugh & Magliaro, 2006). The visual connections between the components in these ID models imply an alignment of learning, teaching, and assessment decisions, as well as guidance on working through the decision-making process. Thus, ID’s systematic features keep learning issues in the forefront as teachers design, teach, and evaluate their intervention efforts (Smith & Ragan, 2005).

ID models provide visual representations of this complex intellectual and problem-solving process (Nelson, Magliaro, & Sherman, 1988). Some models advocate a step-by-step approach to help newcomers learn ID (Dick et al., 2005), while others “may be quite dynamic, recursive and never-ending” (Gustafson & Branch, 1997, p. 74) depending on their use (e.g., Morrison, Ross, & Kemp, 2004). Attempts to develop ID models for teachers have focused on, how to more closely approximate teacher tasks (e.g., Gerlach & Ely, 1980; the ASSURE model from Smaldino, Russell, Heinich, & Molenda, 2005; Reiser & Dick, 1997). However, due to the very individualistic and personal nature of planning and teaching, the complexity of classrooms, and the multiple influences affecting their practice (Kennedy, 1994), as well as demands made on their time, it has proven difficult for teachers to adhere to these systematic processes in their daily practice. Models are persuasive because they provide ready-made approach to follow, but teachers have resisted these goal-directed approaches, possibly because they may not match teachers’ beliefs about their abilities to influence student learning (Martin & Clemente, 1990).

**Instructional Design for Accountability**

Teachers tend to resist any process or innovation that appears to them as overly prescriptive and ill-suited to address changing classroom conditions (Snelbecker, 1988). Despite this resistance, ID can be connected to teacher education through the Interstate New Teacher Assessment and Support Consortium (INTASC) standards and the National Board core principles. The INTASC model core standards are meant to apply to teachers in all teaching regardless of content area or expertise. The standards “embody the kinds of knowledge, skills, and dispositions that teachers need to practice responsibly when they enter teaching and that prepare them for eventual success as National Board-certified teachers (National Board for Professional Teaching Standards) later in their career” (Council of Chief State School Officers, 1992). For example, Principle 3 of the INTASC standards addresses the need for teachers to understand how to teach diverse learners. In ID, one of the functions of a needs assessment in ID is to learn about
one’s students. Principle 4 encourages teachers to use a variety of instructional strategies, another decision-point in most ID processes. Principle 9 advocates teachers to develop reflective practitioner habits that continually evaluate the effects of their choices and actions on others. The use of ID has the potential to help teachers to systematically reflect on how one develops “a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation,” which is INTASC Principle 5.

National Board Certification provides another connection between teaching and ID. The National Board for Professional Teaching Standards was created in 1987 to acknowledge professional teachers. Teachers submit performance-demonstrating materials to be judged against the Board’s certification standards. All certifications are based on several core principles, one which advocates that “Teachers systematically think about their classroom practice and learn from experience” (National Board for Professional Teaching Standards, 2004).

In our teaching of ID we frame it as a means to help teachers become better teachers through systematic development, teaching, and reflection. Our conceptual image of the teacher is that of a reflective practitioner (Clark & Yinger, 1987; Schön, 1983). While ID can be regarded as a construct of developing formal teacher knowledge, ID as framed by us provides a tool to acknowledge practical knowledge and also provides a way to systematically review this personal knowledge, craft knowledge, and knowing-in-action.

However, for ID to be effective for teachers, ID instruction must take into account the world of teachers. Branch (1994) provides conditions for ID to be considered by teachers:

- The goal for instruction should be to facilitate learner achievement as determined by the learner and the culture, which will influence the learner.
- People involved in the learning process should understand the complex relationships within instruction so as to support each other.
- ID is an appropriate response to the complexities of instruction.
- ID practices may be applicable at different levels of application and contexts.
- Teacher input should be included in the development of an ID model.

Our strategy in ID instruction for teachers is to ask them to develop their own ID models. ID is best known for its models on how instruction should be developed. We believe that people can learn from these models, but what may be more productive in the long run is to encourage teachers to develop their own representations. In our view ID provides teachers with one tool to (a) develop instruction, (b) operationalize a reflective orientation, and (c)
evaluate one’s teaching (Shambaugh & Magliaro, 2001). Teachers need to be able to instantiate their own design processes in order for their personal reflection and professional growth. Despite concerns over their “drawing” ability and a limited understanding of the formal field of ID, students, many of whom have been or who were teachers, have developed a wide variety of visual representations of the ID process in our ID courses over the past 10 years. How these teachers represented their views of teaching in these models is the main focus of our inquiry in this chapter.

METHODOLOGY

Methodological Approaches

Categorization and metaphor are human achievements that are difficult to study. Experimental studies can easily be confounded by the influence of other aspects of the human person, such as perception. Another research approach is empirical modeling in which human observations and actions are mathematically recorded, and regression is used to identify the input–output relationships. Such an approach is useful when very narrow expertise is required and when equations used to model teaching seem untrustworthy. A third approach is the use of analytical modeling in which human performance is compared to performance data. The goal is to minimize the differences between what humans do and what they should do based on an agreed-upon mental model. Of course, this approach assumes that the mental model of teachers could be agreed upon.

A more useful approach has been the use of “think-alouds” to record what people say about what they do as they perform the task (Ericsson & Simon, 1993). The basis for Strauss and Shilony’s (1994) study of teachers’ models of children’s minds was based on how teachers speak about instruction. Limitations include that what is reported is distorted and biased partly on the person’s inability to verbalize how one is thinking as well as responding to the needs of the researcher. Teacher talk frequently includes the use of metaphors that characterize how teachers think about teaching (Munby, 1986). For example, teachers frequently use the word “flow” between activities or between lessons suggesting some form of motion. In our study, teachers identified many metaphors that were meant to denote an ID process but also, we believe, identified their views of teaching, of students, and their educational role. Verbal and written reports, according to Rouse and Morris (1986), may be useful in generating research questions for sub-
sequent study. The use of interviews and surveys are often used after the task has been completed to study individual judgments and decisions (Gould & White, 1974).

Participants and Settings

A total of 190 models from 13 deliveries of a master’s level ID course were collected from 1994 to 2001. Of this corpus of data, 123 ID models from students who were self-identified preservice or practicing teachers, or teachers who were transitioning into administration or educational support personnel, were culled for this study. The authors of this paper have taught this course, either as co-instructors or in ongoing collaboration at two institutions, since 1994. As a result of this collaboration, the instructional approach and course sequence described below were applied fairly equally across all courses taught. All 13 deliveries were taught at the master’s level at two doctoral-granting, land-grant institutions.

The ID Course and Instructional Approach

Our reflexive teaching approach views instructor and student as co-participatory, meaning that although instructors and students have different roles, all participants can learn from each other (see Shambaugh & Magliaro, 1997, 2001 for a detailed description of this teaching approach). Through constant feedback, instructors and students design and serve as formative evaluators in a supportive and collegial way using in-class peer and out-of-class verbal and written feedback. Rather than depicting ID as a complex algorithm, rules, or procedures, which could not cover all contingencies of human learning and classroom realities, we advocate that teachers consider a range of possibilities that might responsively address the learning needs of their students (Shambaugh & Magliaro, 1997). We engage them in tasks in which they use ID components and processes, reflect on their appropriateness, and revise their draft projects based on this reflection and our feedback.

The ID Model Task

The ID course content consists of four general units: Getting Started, Analysis, Designing, and Evaluation (Shambaugh & Magliaro, 1997, 2001). The three latter units correspond with the conventional components considered in general ID instruction (e.g., needs assessment, goal/objective setting, assessment, instructional strategies, media, etc.). However, the
“Getting Started” component is when the students begin to instantiate their held beliefs and procedures for learning and instruction by identifying key learning principles that support their teaching philosophy and their own ID model. And, while the course itself has evolved over the years, this task for students to develop personal ID models that would transfer to their own use has remained consistent.

The actual assignment occurs across the entire semester. At the beginning of the semester, students are asked to represent their own preliminary design or planning process. This task serves two purposes: (1) to honor their present conceptions of the ID process, and (2) to provide a tangible representation of a tacit process, such as their current planning processes, that could be examined in a more open manner. The specific directions are:

- **Depict** on paper your own model for designing/planning instruction. A model is usually a visual representation—a picture, but you can be creative and try other approaches. The model should represent the important aspects of developing instruction and the relationships of these aspects to each other. **Write** a brief narrative explaining the model in terms of the important components of your model and the relationships between components.

As the initial prompt, we share widely used ID models that they would find in textbooks including Dick et al. (2005); Gagné, Wager, Golas, and Keller (2005); Gerlach and Ely (1980); the ASSURE model from Smaldino et al. (2005); Morrison, et al. (2004); the Rapid Prototyping model from Tripp and Bichelmeyer (1990); the United States Air Force model (1975); and the Layers of Necessity model from Wedman and Tessmer (1990). We then engage them in a group activity in which they characterize the components and processes of their lesson planning, and invite them to think about how they would represent this process visually, via metaphor or some alternate representation to a novice.

This preliminary ID Model and narrative are shared in the class. Throughout the semester, students are asked to compare conventional components and points of consideration with their own models. At the end of the semester, we give students the same set of directions and ask them to revise their models and the narratives that explain the various components, relationships among components, and design thinking processes that make the model usable in their own teaching practice.
Our initial plans were to code just the type of mental model that each teacher constructed in order to articulate his/her representation for ID. However, during the analysis process we discovered that the teachers also indirectly shared with us their own views of teaching within this same representation. The data included 123 final ID models and narratives that the teachers submitted at the end of the semester (i.e., their “final” personal ID models). Teachers were identified by responses they made on profile cards distributed at the beginning of each course. Two copies of each model and narrative were made so that we could code the types of models separately using a category system derived inductively through reviewing the models and reading the literature on mental models (e.g., Gentner & Stevens, 1983; John-Steiner, 1997; Mayer, 1989). A recursive process of categorization and theme building was used (Spradley, 1980). Discussion and consensus building were used to create the categories. We then recoded all models for types of models again according to our finalized coding system. At this point we achieved 97% agreement on the categories. Again, we reviewed the specific models where there was disagreement and came to consensus. The category system for types of models is as follows:

- **Artifact**: a concrete object; e.g., a pyramid, a tea cup.
- **Components**: an abstract representation with components connected; e.g., intersecting rings, concentric circles.
- **Human activity**: a human thinking process or action; e.g., problem solving, creativity, reading.
- **Organic**: a natural or nature-related process; e.g., the waves of an ocean, a growing tree or flower, a rainbow.
- **Flow chart**: a traditional representation of boxes and arrows to depict component and direction of activity.

To analyze the models for views of teaching, we again followed our earlier process. We reviewed the models looking for patterns of similarity, and we read the literature on views of teaching (e.g., Berliner & Calfee, 1996; Bransford, Brown, & Cocking, 1999; Edmonds et al., 1994; Richardson, 2001). The resultant category system was based on synthesis of perspectives from the ID literature and the literature on teaching and teacher education.

- **Designer-centered**: the teacher maintained a stance of being outside the actual teaching of the product; i.e., creating the instructional event, but not having to implement it.
• Learner-centered: learners were identified as central to the model, and the primacy of learners was upheld in the narrative.

• Teacher-centered: explicit representation of teacher issues and the primacy of the teacher (and for the teacher) to make the decisions about design decisions and the enacted instruction.

• Co-centered: the interactions between the teacher and the students were central in the design and implementation decision-making, a more negotiated process. Models that also included the designer were categorized here.

• De-centered: the educational context drove the decision-making and implementation (e.g., expectations of parents, other teachers, principals, state learning standards, federal mandates).

In both category systems defined above, the categories within each system were not mutually exclusive. That is, models sometimes depicted characteristics of two or more categories. For coding, models were labeled based on the primary or predominant features instantiated in the model. Frequency counts for each set of categories were conducted. A descriptive analysis of those counts was conducted.

### FINDINGS

Our findings are organized into two sections: types of models and views of teaching.

#### Table 2. Frequency Counts for Types of Models.

<table>
<thead>
<tr>
<th>Type of Model</th>
<th>Frequency (% of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human activity</td>
<td>51 (42)</td>
</tr>
<tr>
<td>Components</td>
<td>23 (19)</td>
</tr>
<tr>
<td>Artifacts</td>
<td>20 (16)</td>
</tr>
<tr>
<td>Organic</td>
<td>15 (12)</td>
</tr>
<tr>
<td>Flow charts</td>
<td>14 (11)</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
</tr>
</tbody>
</table>
As stated earlier, types of models were coded into five categories: human activity, components, artifacts, organic artifact, and flow charts (see Table 2). Out of the 123 models, 51 (42%) were categorized as human activity. Examples of human activity included playing basketball, training for running events, climbing stairs, designing a garden, hiking, juggling, kayaking, living in a neighborhood, solving problems, directing a stage play, swimming, and traveling. Teachers identified human activities, which they understood in order to represent ID components. For example, one teacher used a baseball diamond to arrange the various components in the order that a batter would run the bases after hitting the ball. Another teacher used juggling to represent ID, where the designer is the juggler and the various ID considerations are the objects to be juggled. To further drive the point home visually, the teacher drew the juggler on a balancing board while trying to keep all of the components in the air.

Twenty-three (19%) of the models were categorized under the components category. Components were defined as any abstract representation including shapes, such as circles and rings, and ways of connecting these shapes, such as concentric circles. Teachers included a range of different components, often specific to their contexts, to illuminate their ID process. Component examples included circles, iconic shapes, layers, levels, musical notes, stages, and webs. Models in this category depicted the ID process with the various components organized into some abstract shape or set of shapes that were clearly interactive, with the ID process itself seen as a recursive intellectual activity. Many of these models fit Gustafson and Branch’s (1997) notion of a curvilinear composition that characterizes the way that ID is typically practiced. The students still tended to use arrows to depict the relationships between the model components, but often those arrows were bi-directional. Sometimes, these models included components that were visually overlapping to illustrate the connections between the ID considerations. Typical words in the accompanying narrative included “cycle,” “interaction,” “creative,” and “recursive.” Overall, teachers using components depicted ID holistically and fluid with no particular component taking precedence at all times. Compared with human activity models, in which the metaphoric activity provided the basis for representation, component models conceptually represented ID components similar to published ID models, but attempted to improve the flow chart representation of boxes and arrows with shapes more appropriate to their sense of the ID
process. For example, the nesting of circles within circles communicated an interrelationship between ID activities.

Twenty (16%) of the models were determined to be specific artifacts, concrete symbols that held significance for the teachers. Examples of these models included a bread machine, bridge, clock, cue ball, playground slide, pyramid, quilt, school building, speedway, train track, and umbrella. Here, the teachers used a metaphoric object to suggest what ID was, but the supporting features provided minimal guidance for how ID should be conducted.

Fifteen (12%) were organic with 8 of the 15 being either trees or flowers. Other models included fish-eating-knowledge, heart, rainbow, tributary, and waves.

Fourteen models (11%) were flow charts. Sometimes, the components were connected by arrows and/or lines in an ordered sequence. Similar to the Gustafson and Branch’s (1997) characterization of a “rectilinear row of boxes,” these models depicted a clear order of operations. Some of the models in this group featured branching and/or operations that were to be considered simultaneously. Another feature of models in this group was a hierarchy of activity. The teacher visually organized the steps so the intent was clear and certain steps were more important and required more attention, time, and effort than others. The words students used in the supporting narrative helped us to classify models into this category. Words such as “systematic,” “orderly,” “input,” “output,” and “linear” were characteristic of the descriptors used in the narratives accompanying these models.

We found this to be quite interesting given that, in the literature, the predominant representation for the ID process is a flow chart. While the flow chart makes historical sense given the ID field, and it can transcend a range of audiences because it is intended to be context-free, we found it interesting that given the option, teachers preferred to use other representations for articulating a process that was meaningful for them.

Views of Teaching

Based on our category system, 87 of the 123 ID models (71%) revealed a view of teaching other than that of an instructional designer (i.e., a person not intimately connected with the enactment of the instructional event). That is, designer-centered ID models, which in many respects represent the focus of the course, accounted for 36 models (29%). Teacher-centered ID models accounted for 47 models (38%). Co-centered ID models accounted
for 18 models (15%). Learner-centered views of teaching accounted for 16 models (13%). De-centered ID models accounted for six models (5%) (see Table 3).

### Designer-Centered ID Models

The purpose of the ID model task was to have teachers represent their own ID process, so one would have expected to see ID models closely approximate our sequence or one of the conventional models we introduced to students. However, this was not the case in that only 29% of the models followed a conventional ID flow-chart approach (see Fig. 1). The features common to ID models, including the traditional components of analysis, design, development, implementation, and evaluation (i.e., the so-called ADDIE model of ID) were only found in these representations.

### Teacher-Centered ID Model

The largest number \( n = 48; 39% \) of models representing this view of teaching were classified in this category. Teacher-centered views of teaching in students’ ID models directly represented the ID process in a way that made sense for them and used a metaphor that frequently resonated with their personal interests, such as cooking, sailing, reading, or gardening. Other examples of teacher-centered views included a creative spiral, a set of questions, tour guide, fast food preparer, problem solver, base runner, kite handler, and garden designer. In Fig. 2, a “continuous” view of teaching was depicted in the student’s ID model. The student’s narrative discussed three aspects of instruction design, which also denoted this teacher’s routine. The first aspect is being knowledgeable about the subject matter, which enables the teacher to be flexible and creative and to adapt to different learning styles. A second aspect of the model is to set goals and objectives

### Table 3. Frequency Counts for Views of Teaching.

<table>
<thead>
<tr>
<th>Type of Model</th>
<th>Frequency (% of Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-centered</td>
<td>47 (38)</td>
</tr>
<tr>
<td>Designer-centered</td>
<td>36 (29)</td>
</tr>
<tr>
<td>Co-centered</td>
<td>18 (15)</td>
</tr>
<tr>
<td>Learner-centered</td>
<td>16 (13)</td>
</tr>
<tr>
<td>De-centered</td>
<td>6 (5)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>123</strong></td>
</tr>
</tbody>
</table>
for each lesson, which “often generate from the [state] standards of learning.” A third aspect seen in the model was evaluation, and “as teachers, we need to know what works and what does not work. One way of doing this is by reflecting on what we do as a teacher in order to make our curriculum better. Better teachers make better students.”

Co-Centered ID Models
Co-centered ID models ($n = 17; 14\%$) included a mix of participants in the design process, including teacher–student, teacher–designer, teacher–student–designer, and designer–student. Reciprocity and collaboration are key themes in these models. In the example shown in Fig. 3, the student wrote that “collaboration through social interaction and positive communication builds a positive working environment among people,” and that the purpose of the model is to provide a comfortable working environment. The wavy line represents all of these interpersonal skills needed to create an atmosphere of support,” while “the outer circle represents a strong connection that bonds the three groups together.” Participants in this model include administration, faculty, and staff, and the arrows denote close ties between
each group. The process of collaboration begins with a mission and supporting goals. Although not represented in the visual, the student’s narrative stated that an assessment of participants’ needs determines learner and environmental characteristics. In turn, these characteristics influence the choice of an instructional framework. An evaluation to determine learner achievement and program effectiveness was also specified.

Learner-Centered ID Models

Learner-centered views of teaching \((n = 16; 13\%)\) represented learners as the principal focus of design efforts and included numerous learner-orientation metaphors, such as a tea cup, inviting atmosphere, hurdler, experiences, well-being, climbing a playground slide, and a school building. In one example (see Fig. 4), the student viewed ID as a swimming child – a “holistic
student-centered approach. All of the pieces of ID work to keep the student afloat." She did not see a linear approach to the ID process, preferring to consider each student and each situation individually. Her point was that in order to meet student needs, she had to maintain a flexibility, yet a synergy, among the various issues she wanted to consider in her daily planning. Her role as teacher and designer was to ensure that everything flowed.

De-Centered ID Models

"De-centered" characterized models \((n = 6; 5\%)\) revealed a dependence on client needs, institutional requirements, or state-imposed standards. In this category teachers were seen as a cue ball who "sink the right balls," a dart thrower who attempted to hit the "state standards" bulls-eye, a juggler, a railroad train on a track, and "driving through the neighborhood" (attempting to drive a straight line or shortest distance). An example of this reactive view of teaching from a special education teacher (see Fig. 5) has arrows pointing to two different ways, "which is how I see the balancing act that I have to perform on a daily basis." The arrows pointing to the left indicate demands she has no formal control over, such as curriculum, state standards, and individualized educational plans (IEP). The arrows pointing to the right, meanwhile, represent items she has some control over, such as finding and addressing students’ strengths and weaknesses, interests, and selection of instructional materials. In the model and narrative she describes
herself: "I am at the bottom (emphasis ours) of the model. I chose the juggler because I see myself juggling the weight of certain combinations of these demands on a daily basis."

LEARNING FROM THE TEACHERS’ PERSPECTIVE

What Questions about Teaching Guided the Research?

Our primary aim in this research was to see how teachers’ personal models of ID also revealed their views of teaching. Originally, the research was based on a cognitive psychology, in terms of the veracity of teachers’ ID models in representing the ID process and how students were representing ID components and connections between components. Analyzing these models for “views of teaching” signaled an additional direction in our inquiry to better understand teachers.
How and Why Were the Questions and Perspectives Chosen?

Our teaching of ID advocates its use as a systematic tool to develop instruction. Over 10 years of writing about ID pedagogy we have come to believe that a parallel attribute for ID is its capacity to help teachers examine their teaching. However, teacher use of ID has been minimal owing to several factors, including an unawareness of ID, the time demands of ID, and the inability of one ID model to address teachers’ individual needs. We chose to look more closely at the ID models of our students, many of whom were teachers, to better understand teachers and make adjustments in our teaching. These teaching adjustments involved our representation of the ID process and a better understanding of the contextual issues facing teachers.
What was Learned about Teaching, Teacher Thinking, Teacher Education, or Learning to Teach?

The ID model task helped us to envision how ID can (a) contribute to teacher knowledge and expertise, and (b) understand individual teachers and their role in the educational process.

Teacher Knowledge and Expertise

The different perspectives of teacher knowledge were categorized at the beginning of this chapter as formal knowledge, practical knowledge, and transformative knowledge. These categories match and were meant to clarify Cochran-Smith and Lytle’s (1999a) labels of knowledge-for-practice, knowledge-in-practice, and knowledge-of-practice. To summarize, formal knowledge is that knowledge base used to develop competent teachers, while practical knowledge instantiates teachers in teaching, and transformative knowledge helps teachers to assume a more critical role within the context of schools.

The value of ID is that the process, whether it is used or not for its original purpose, the development of instruction, becomes in a larger sense, a lens by which an explanation of teachers’ formal knowledge, practical knowledge, and transformative knowledge are possible (see Fig. 6). ID, as framed for teachers as systematic decision-making (Shambaugh & Magliaro, 2006), helps teachers to make clear decisions on learning outcomes,

![Diagram of Instructional Design as a Lens for Teacher Knowledge]

Fig. 6. Instructional Design as a Lens for Teacher Knowledge.
assessment, teaching, and technology. This systematic decision-making contributes to the development of formal knowledge in teachers; namely, a process for unpacking the complicated situation of the classroom. Here, needs assessment, a traditional component of ID, becomes another question for teachers, which can be made more relevant to their circumstances by asking the question: *What do I know about the classroom?* Such a question implies learning more about student differences, as well as content knowledge and pedagogical content knowledge, and an ecological understanding of the context of the classroom, school, school district, state, and federal priorities.

Reframed in this fashion, systematic decision-making in teachers connects to the development of practical knowledge and a greater understanding of the facets of teaching, including classroom management, learning beliefs, preparedness and confidence, and reflection. ID activities, including the ID model task, prompt teachers to confront and make explicit their views on teaching. ID’s systematic features provide the teacher with a process to study and document one’s teaching, a feature of transformative knowledge. At the same time ID provides a foundation to ground a teacher’s development as a teacher in a blend of personal practical knowledge (e.g., learner differences at specific grade levels, school context, and state standards) and a personalized knowledge base (e.g., teaching models and strategies, learning theory, and subject matter understanding). Finally, such activities as studying one’s teaching and building a personal foundation for teaching contributes to the development of teacher voice (Hargreaves, 1996), and a greater sense of having a personal say in curriculum and schools.

In a larger sense, the ID model task helped to remind us that the development of teacher expertise can be viewed as both (a) cognitive knowledge and (b) personal sensibilities and agency. As teachers’ decision-making skills can be characterized as novice, then by progressively more skilled categories (e.g., Dreyfus & Dreyfus, 1986), they develop a developmental awareness of the human sensibilities necessary to assist learner needs, but also the development and awarenessness of their personal role, empowerment, and teacher voice in the educational system.

**Individual Teacher Knowledge**

The two research questions in this study asked how these models could be categorized in terms of model types and views of teaching. The different types of models (i.e., artifact, components, human activity, organic, and flow chart) revealed artificial representations of teachers’ models of ID, but which served to identify the tacit knowledge of individual teachers. It is
unlikely that teachers (or any other newcomer to the process) could actually use their ID models to analyze, design, and evaluate instruction. However, these model types helped us to see how teachers see the process; for example, whether they viewed ID as a technical process or as a human activity. These model types were frequently characterized by a predominant metaphor. The metaphor would likely prove inadequate to actually conduct ID, but the metaphor does signal how ID initially makes sense to a teacher and provides an individualized learning path to assist that teacher in actually using ID. Analyzing the models for different views of teaching helped us to see teachers’ stances towards practice, such as their decision-making and their agency in teaching. Further inquiry on our part could study how metaphors might help us to see into the inner thought processes of designers and teachers (Coyne, 1995). The role of metaphor in communication and understanding has been acknowledged by linguists and philosophers, but has resisted formal approaches to characterize it as meaningful (Fauconnier & Turner, 2002).

The teachers did succeed in depicting their models in terms of identifying the ID components important to them and visualizing the relationships between these components. However, the tacit knowledge that guides teacher decision-making and actions was not yet articulated in these representations. Procedures for using the models were not always clearly explained in the narratives accompanying each model, particularly for the non-designer-centered models. Teachers’ actual understanding of these relationships was not always evident in either the visual or the narrative.

The words used to describe the models were unique. Many teachers explored all of the nuances of the metaphor and how its various features fit their understanding of ID. The narratives varied in elaboration from a very superficial set of connections between the metaphor and the ID process to very detailed explanations. While no systematic analysis of why these descriptions varied was conducted, anecdotal evidence indicated variations were due to the degree to which the individual engaged in the ID model task in a more creative and playful manner, and the degree to which the individual was familiar with the metaphor.

What were the Strengths and Limitations of the Methodological Approach?

One limitation with this study is the possible favoring of our representations of ID; that is, either our definition of ID with an emphasis on addressing the human side of ID and/or the ID model that we used to represent the course.
flow and curriculum (Shambaugh & Magliaro, 1997). The teachers’ versions were quite different from ours. Although they may have valued the inclusion of our model’s components, the components appeared in a unique fashion in each model. A second limitation was relying on the visual and written narrative for our interpretation of the models and assignment of categories without checking our interpretation and category matching with the teachers themselves. A third limitation of this research, and perhaps the most serious, was not describing in more detail the personal and professional contexts in which the participants led their lives. Students were categorized as teachers based on the simple distinctions outlined earlier. More detail about their contexts would be helpful in future work as it is these contexts that give rise to teacher voices (Hargreaves, 1996), and only partial representations of these voices may be depicted in these models.

The development of a category system proved challenging, as we immediately realized the difficulties of developing a limited number of categories to adequately label model types or views of teaching. It is necessary, however, that when faced with this challenge researchers must start somewhere. Views of teaching are based on many experiences, including formal education, professional development, and actual classroom experience. It would be interesting to trace back from these representations the history of these teachers to better understand the numerous influences that gave rise to the models. One of the lessons we learned from analyzing these models is that we must do more work to document the histories of the teachers to gain a better understanding of the graphical views of teaching. In addition to employing a Learner Profile to help students in the ID course document what they know about their learners, we could prompt a more detailed Teacher Profile, which could include this contextual history. Within these histories one would likely note the various individual ways that teacher knowledge developed. It would be interesting to see how these histories provide some insight into the different ways that teacher knowledge has been characterized. We have conducted one case study comparing novice and expert teachers from a course (Shambaugh & Magliaro, 1996), but continuing such a study post-course would be valuable to see to what extent the course experience changed their teaching. Another next step would be to conduct a study analyzing the impact of the course on the students/teachers who have taken this course.
How has our thinking Developed about Questions, Methodology, and Representation of Findings?

This chapter has documented inquiry into teacher knowledge using images to reveal teachers’ views of teaching, rather than trying to formalize teacher knowledge in some manner. Our challenge is to support the development of these personalized approaches. In the short term, teacher education methods courses or ID courses might have teacher candidates design lessons using their own ID model, revising the model as a result of what they learn from teaching and reflecting on these lessons. For novices a procedural version may be necessary through a reflective cycle in which the model evolves as the teacher thinks about instruction. From lessons, the teacher candidate can use the ID process to develop instructional units. We have re-framed the ID process in terms of a cycle of decision-making (Shambaugh & Magliaro, 2006) involving decisions of learning outcomes, assessment, teaching, and technology. The model provides a working mechanism to guide teachers to design instruction responsive to the needs of their students and the agenda of the school and school system. Ongoing study of ID model development by teachers might help teacher educators to better understand the development of teachers’ skills in developing instruction but also in terms of teachers’ views of teaching, students, and their role in the educational process.

We have explored some aspects of the implications of these models (Magliaro & Shambaugh, in press). One implication is the value of instructors being critical of their representations of concepts or processes. Our study confirms the Seel’s (2003) findings that learners do not always use the models given to them, but construct models that meet their specific needs. Our purpose with the ID model task was ostensibly to gain a better sense of how students understood the ID process. Over time the ID model task provides us with different ways of representing the ID process to newcomers. Consequently, we have become consumers of our students’ work and have learned about the ID process from our students. By being reflexive we gain not only a better understanding of the complexity of learning ID, but also information to use in course improvement. In other words, our ID pedagogy models for students the development of teacher knowledge.

Another issue is to question the value of our representation in teaching a complex process, which cannot fully address different users and contextual issues. We are beginning to see that our ID model task helps learners in two ways (Markman, 1999). The first is that the model task gives students a process for thinking about and solving complex instructional problems in
ways that are meaningful to them. Their ID models are context-specific and
draw upon many examples of teaching experiences to solve a novel problem.
Second, students gain a better understanding of our representation of the
process to be learned. For most ID courses, this is the primary learning
outcome. However, mastering a model of a complex process such as ID is
not possible in a one-semester course. To use ID well requires that one have
an extensive knowledge base across many situations and perhaps a reper-
toire of design thinking, which has not been well articulated, although the
ID field has been moving toward the adoption of competencies. Students in
the course do not have the knowledge and experience to use ID, despite their
rich repertoire of practical knowledge. We have learned in this course that
students may be experiencing difficulties in applying this knowledge to bear
at the same time learning a new conceptual approach to designing responses
to learning needs.
As a pedagogical feature in our teaching, the personal ID model task was
structured to encourage students to represent their own model of ID com-
ponents, rather than having one imposed on them. In our examination of
personal ID models, especially those constructed by teachers, we noticed
that we also learned about teachers’ representations of their views of teach-
ing. That is, personalized ID models, particularly for teachers, more closely
“modeled” the individual teacher’s thinking (Elbaz, 1983), although they
did not completely tell the story of their design thinking. And, while an-
ecdotally the teachers reported that the models did afford them the oppor-
tunity to articulate the range of considerations for planning, and to help
them better align their goals, instruction, assessment and so forth, at this
point in their self-reflection, they had not developed the language or rep-
resentation to fully investigate their work. The ID model task has surprised
us in that an activity sometimes depicted as an overly prescriptive approach
to instructional development, provided us with a lens on how teachers
viewed teaching. The resulting images and narrative could be thought of as
what happens when we look through a kaleidoscope and each turn of the
wrist produces a different image. What one sees in terms of the facets of
teaching, then, depends on who is viewing and what one values and believes.

UNCITED REFERENCES

REFERENCES


Teachers’ Personal Models of Instructional Design


### Queries and / or remarks

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